

THE GENUS *Hexacladia* ASHMEAD

(HYMENOPTERA: ENCYRTIDAE)

B. D. BURKS, *Systematic Entomology Laboratory, Agricultural Research Service, U. S. Department of Agriculture*<sup>1</sup>

ABSTRACT—*Hexacladia* Ashmead is a remarkable genus having males with branched antennae. It should be placed in the tribe Encyrtini, with *Encyrtus* Latreille, but a subtribe Hexacladiina is required for it. All the species of *Hexacladia* occur in North or South America and parasitize Hemiptera-Heteroptera of the families Pentatomidae, Coreidae, or Pyrrhocoridae. Six species are treated, 2 of which are new: *H. leptoglossi*, from *Leptoglossus phyllopus* (L.), and *H. hilaris*, from *Acrosternum hilare* (Say).

In 1891 Ashmead described *Hexacladia*, which he called a "remarkable" new encyrtid genus from Brazil that had a male with branched antennae (Ashmead, 1891). He ventured no opinion about its relationships with other encyrtid genera because L. O. Howard was just then preparing a paper on the encyrtid genera having males with branched antennae. A few months later, Howard's paper appeared, and he discussed all the known encyrtid genera having this kind of males, including *Hexacladia* (Howard, 1892). His conclusion was that the encyrtids having males with branched antennae "can not be said to form a natural group." That opinion is still held today, for the encyrtid genera with males having branched antennae are scattered throughout the family in current classifications. Howard was, however, rather of the opinion that *Hexacladia* should form a tribe of its own, because he was unable to relate it to any other encyrtid genera.

In his 1900 classification, Ashmead included *Hexacladia* in the tribe Mirini, the huge tribe that included over two-thirds of the encyrtid genera known to him at that time (Ashmead, 1900). His 1904 classification was very little different, leaving *Hexacladia* buried in the Mirini (Ashmead, 1904). Schmiedeknecht's classification, being almost a literal translation of Ashmead's from English into German, made no change in the placement of *Hexacladia* (Schmiedeknecht, 1909).

Two years later Crawford described the genus *Sophencyrtus* from a single female specimen that had been reared from the adult of a pyrrhocorid bug in Peru (Crawford, 1911). He decided that its characteristics would place it "in the Encyrtini rather than in any other group." Later on Girault (1917) recognized *Sophencyrtus* as a synonym of *Hexacladia*. Crawford's opinion, however, that it should be assigned to the Encyrtini was a very illuminating opinion, because it showed for the first time the true relationships of this genus.

<sup>1</sup> Mail address: c/o U. S. National Museum, Washington, D.C. 20560.

When Hoffer (1955) published his tribal classification of the Encyrtidae, he based it almost entirely on European genera, so he did not consider *Hexacladia*. He included only the genus *Encyrtus* Latreille in the Encyrtini. Crawford had a very good eye for relationships, however, so it is instructive to list the similarities between *Hexacladia* and *Encyrtus*. Those similarities are as follows:

Both have similar blunt, broad mandibles; head broad, with occipital margin sharply carinate; middle and hind tarsi each with basal segment elongate; propodeum elongate, propodeal spiracles round and relatively large; axillae elevated above level of base of scutellum; forewing with a thickened bulla at point of divergence of obsolete vein Rs in submarginal vein and a darkened cross-fascia on wing at this point; marginal vein short and thick, postmarginal and stigmal veins long, equal to or longer than marginal; hindwing with broad costal cell; and female gaster without paratergites.

On the other hand, there are great differences between *Encyrtus* and *Hexacladia*. In *Hexacladia* the female antenna has the first funicular segment greatly lengthened and the club is unsegmented; the male antenna has long branches on the funicular segments; the scutellum is without an apical brush of bristles; and the female apical gastral sternite is strongly plowshare-shaped, with unique modifications at its posterior margin. In *Encyrtus* the male and female antennae are quite unlike those in *Hexacladia*, there is a strong tuft of bristles on the scutellum, and the apical gastral sternite is weakly developed into a plowshare-like structure, and lacks the distinctive modifications of the posterior margin found in *Hexacladia*.

Biologically, also, the two differ. *Encyrtus* parasitizes Hemiptera-Homoptera of the family Coccidae. *Hexacladia* parasitizes free-living Hemiptera-Heteroptera of the families Pentatomidae, Coreidae, and Pyrrhocoridae, emerging from the adult bugs or, occasionally, from the mature nymphs.

If these two genera are to be placed in the same tribe it will be necessary to form subtribes for their logical reception, the genus *Encyrtus* being placed in the Encyrtina and *Hexacladia* in the Hexacladiina.

De Santis (1965) has proposed a subtribe Hexacladii of the Mirini for *Hexacladia*, far removed from any relationship with the Encyrtini.

#### Genus *Hexacladia* Ashmead

*Hexacladia* Ashmead, 1891, Ins. Life 3:456.—Howard, 1892, Proc. U. S. Natl. Mus. 15:364.—Dalla Torre, 1898, Cat. Hym. 5:230.—Ashmead, 1900, Proc. U. S. Natl. Mus. 22:377.—Ashmead, 1904, Mem. Carnegie Mus. 1:301, 308, 377.—Schmiedeknecht, 1909, Gen. Ins., fasc. 97:235.—Timberlake, 1926, Proc. U. S. Natl. Mus. 96(3):12.—De Santis, 1965, An. Com. Inv. Cien. Prov. Buenos

Aires 4:114.—De Santis, 1967, Com. Inv. Cien. Prov. Buenos Aires, Cat. Hym. Argentinos Serie Parasitica, p. 154.

Type-species: *Hexacladia smithii* Ashmead. Monotypic.

*Sophencyrtus* Crawford, 1911, Proc. U. S. Natl. Mus. 41:275.—Girault, 1917, Descr. Stell. Nov., p. 5 (= *Hexacladia*).

Type-species: *Sophencyrtus townsendi* Crawford. Original designation.

Generic description.—Female: Mandible, fig. 2, blunt at apex, without denticles, angularly produced at apicodorsal angle, as in *Encyrtus*; maxillary palpus with 4 segments, labial with 3. Malar furrow absent. Antennae inserted approximately in center of frons, above level of ventral margins of compound eyes, apices of scapes exceeding level of vertex. First funicular segment elongate; antennal club unsegmented. Occipital margin sharply carinate, lateral ocelli located near or touching occipital margin.

Praescutum without traces of notaulices; axillae elevated above level of base of scutellum, as in *Encyrtus*. Scutellum semiglobose in shape. Forewing heavily shaded with dark brown, a narrow cross-fascia at point of divergence of obsolete vein Rs from submarginal vein, as in *Encyrtus*, and disc of wing mostly brown, a hyaline streak along path of obsolete vein Cu<sub>1</sub>; venation much as in *Encyrtus*, with marginal vein short and thick and stigmal and postmarginal veins relatively long; submarginal vein with an enlarged bulla at point of divergence of obsolete vein Rs. Hindwing with costal cell broad. Each tarsus of middle and hind pair with basal segment long, subequal in length to segments 2 and 3 combined.

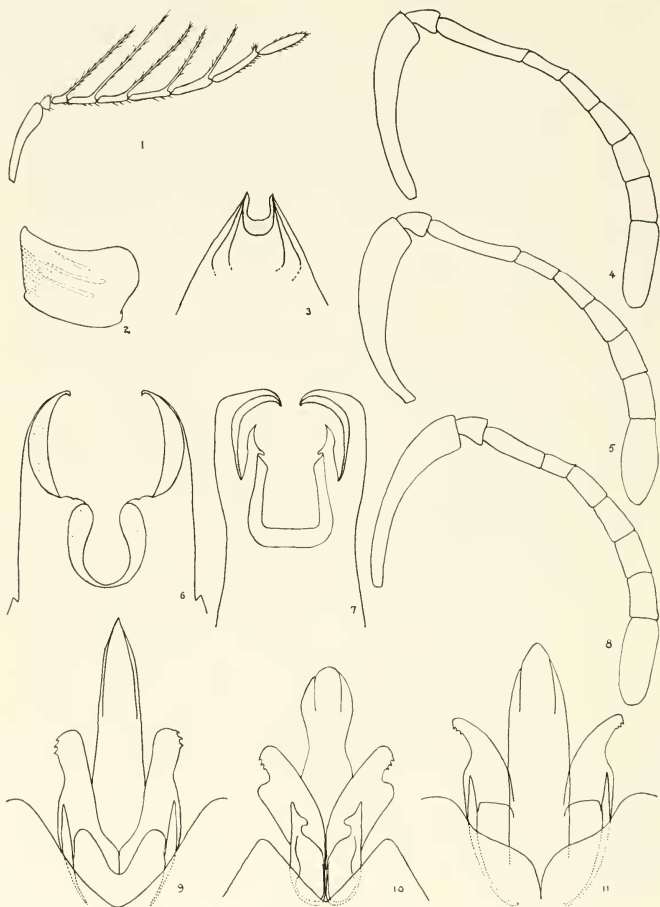
Propodeum long, its median length approximately ½ as great as length of scutellum; propodeal spiracles round, located near anterior propodeal margin. Gaster subequal in length to thorax. Apical gastral sternite produced posteriorly in the form of a plowshare, its posterior margin having a minute median notch, or a minute, projecting point, or a deep median indentation, in all cases a pair of clasperlike projections present lateral to median structures. Ovipositor normally not visible, when extruded, it is elongate and slender. Ovipositor sheaths wide, laterally compressed usually not reaching apex of gaster, but sometimes slightly exceeding it. Paratergites absent.

Male: Very similar to female, but dark shading in forewing less extensive and gaster shorter. Antennal funicle with 6 long branches, and first segment short; club solid or 3-segmented. Genitalia with highly modified sagittae and volsellae in the various species.

All the species for which hosts are known are parasites of Hemiptera-Heteroptera of various families. The known species occur in North or South America.

KEY TO SPECIES

1. Female; funicular segments of antenna without branches and first funicular segment long, fig. 4 ..... 2
- Male; funicular segments with branches and first funicular segment short, fig. 1 ..... 6
2. First funicular segment 1½ times as long as second and less than 4 times as long as wide at widest point, fig. 8; apical gastral sternite bearing a minute, projecting point on meson of posterior margin ..... *leptoglossi*, n. sp.



Figs. 1-11. *Hexacladia* spp.: 1, *blanchardi* De Santis, ♂ antenna (after De Santis, 1965); 2, *hilaris*, n. sp., mandible; 3, *smithii* Ashmead, ♀ apex of terminal gastral sternite; 4, *smithii*, ♀ antenna; 5, *mexicana* Girault, ♀ antenna; 6, *hilaris*, ♀ apex of terminal gastral sternite; 7, *townsendi* (Crawford), ♀ apex of terminal gastral sternite; 8, *leptoglossi*, n. sp., ♀ antenna; 9, *smithii*, ♂ genitalia; 10, *leptoglossi*, ♂ genitalia; 11, *hilaris*, ♂ genitalia.

- First funicular segment 2 or more times as long as second and 5 or more times as long as wide at its widest point, figs. 4, 5; posterior margin of apical gastral sternite deeply indented or shallowly notched on meson, figs. 3, 6 ..... 3
3. Posterior margin of apical gastral sternite deeply indented on meson, figs. 6, 7 ..... 4
- Posterior margin of apical gastral sternite shallowly notched on meson, fig. 3 ..... 5
4. First and second funicular segments clothed with straight hairs; submedian projections at apex of apical gastral sternite almost straight, fig. 6; North America ..... *hilaris*, n. sp.
- First and second funicular segments clothed with hairs having recurved tips; submedian projections at apex of apical gastral sternite strongly incurved at tips, fig. 7; South America ..... *townsendi* (Crawford)
5. Antennal club linear, fig. 4; Brazil and Trinidad ..... *smithii* Ashmead
- Antennal club expanded in the middle, fig. 5; Mexico ..... *mexicana* Girault
6. Lateral branch of sixth funicular segment extremely short, fig. 1 ..... *blanchardi* De Santis
- Lateral branch of sixth funicular segment at least as long as segment itself ... 7
7. Lateral branch of first funicular segment relatively short, only as long as first and second segments combined; sagitta of genitalia shouldered, fig. 10 ..... *leptoglossi*, n. sp.
- Lateral branch of first funicular segment longer, as long as first 3 segments; sagitta not shouldered, figs. 9, 11 ..... 8
8. Hind tibia broadened and subflattened at apex; sagitta gradually tapering to a narrow apex, fig. 11; North America ..... *hilaris*, n. sp.
- Hind tibia narrower at apex than at middle; sagitta stout, apex broad, fig. 9, South America ..... *smithii* Ashmead

**Hexacladia blanchardi** De Santis

*Hexacladia blanchardi* De Santis, 1965, An. Com. Inv. Cien. Prov. Buenos Aires 4:116. ♂.—De Santis, 1967, Com. Inv. Cien. Prov. Buenos Aires, Cat. Hym. Argentinos Serie Parasitica, p. 154.

Type locality.—Baradero, Province of Buenos Aires, Argentina.

Types.—Two male specimens in La Plata collection.

Host.—Unknown.

Distribution.—Argentina.

The female is unknown.

Species placed from the published description.

**Hexacladia hilaris**, n. sp.

Female.—Length, 2.5–3.0 mm. Head, thorax, and propodeum dark tan, gaster black; antennae and legs yellowish tan, with antennal club darkened and tarsi pale; dorsum of thorax and hind tibiae may be darkened. Forewing with a dark brown cross-fascia at point of divergence of obsolete vein Rs from submarginal, a large dark brown median cloud across wing from marginal vein and a round

cloud in disc of apical third of wing, the latter more or less broadly joined to median cloud. Median cloud interrupted by path of obsolete vein  $Cu_1$ . Hindwing hyaline.

Mandible, fig. 2, blunt, without denticles. Height of compound eye  $1\frac{1}{2}$  width of malar space. Clypeus deeply depressed, labrum visible and projecting straight anteriorly over mouth opening. Antenna, with scape expanded at apex, pedicel short, funiculus clothed with short, straight hairs, first funicular segment as long as segments 2 and 3 combined; club as long as first funicular segment. Lateral ocelli located a short distance anterior to occipital margin; ocellocular line  $1\frac{1}{2}$  times as long as postocellar line. Surface of frontovertex smooth, unpunctured, with scattered, fine, short hairs.

Praescutum smooth, shining, sparsely clothed with short hairs; axillae minutely reticulated and dull; scutellum with surface minutely and closely striated, the pattern of striations longitudinal in basal half of scutellum and transverse on its apical half. All coxae clothed with dense, silvery, short hair. Forewing with submarginal vein  $3\frac{1}{2}$  times as long as marginal, postmarginal and stigmal veins equal in length, each as long as marginal.

Propodeum smooth and shining laterally, an irregular, narrow, median reticulated area present. Gaster smooth and shining, a few setae and bristles present only at posterior end. Ovipositor sheaths heavy, in side view showing a prominent subapical angle, then tapering to slender apices, these apices not reaching apex of gaster. Apex of apical sternite deeply indented on meson, a pair of slender, submedian projections present, fig. 6. Gaster as long as thorax.

Male.—Length, 2.25–2.75 mm. Head dark tan, thorax and propodeum tan with more extensive dark shading than in female; gaster black. Middle and hind legs mostly black, fore legs tan; mid tibiae often light; forewing with only a short cross-fascia at point of divergence of obsolete vein  $R_s$  and dark cloud at marginal vein extending only half way across wing; apical spot absent. Antenna with 6 long branches. Gaster  $\frac{3}{5}$  as long as thorax. Genitalia with sagitta tapering to a narrow point, fig. 11.

Type locality.—Independence, Kansas.

Type.—U.S.N.M. catalog number 71974.

Described from 15♀ and 13♂ specimens. Holotype ♀ and 10 ♀ paratypes, Independence, Kansas, reared September 8, 1970, from adult *Acrosternum hilare* (Say), by R. I. Sailer; 2♀ paratypes, same data, but September 9, 1970; allotype ♂ and 10♂ paratypes [all  $F_1$  progeny of a female from the above lot that had been reared September 8, 1970], emerged November 2, 1970, from adult *Acrosternum hilare*, R. I. Sailer; 3♀, 1♂ paratypes, Wooster, Ohio, reared August 11, 1959, from adult *Acrosternum hilare* by G. M. Kelly; 1♀, 1♂ paratypes, Wooster, Ohio, reared June 28, 1960, from adult *Acrosternum hilare* by G. M. Kelly.

Biological relationships.—This is a primary parasite of the northern green stink bug, *Acrosternum hilare* (Say), (Pentatomidae), usually emerging from the adults, but sometimes emerging from the mature nymphs.

**Hexacladia leptoglossi**, n. sp.

Female.—Length, 2.5 mm. Face, antennal scape, and fore legs pale tan; fronto-vertex, antennal flagellum, thorax, propodeum, and middle and hind legs dark brown; gaster black; forewing with a narrow, dark brown cross-fascia at point of divergence of obsolete vein Rs from submarginal vein, a dark brown cloud extending across wing from marginal and stigmal veins, and a discal cloud in apical third of wing, the apical cloud joined to median cloud; hindwing hyaline.

Mandible blunt, without denticles. Height of compound eye  $1\frac{1}{2}$  times width of malar space. Clypeus deeply depressed, labrum visible, but minute and hardly projecting over mouth opening. Antennae inserted slightly above center of frons; antenna, fig. 8, with first funicular segment relatively short and less slender than in *hilaris*. Lateral ocelli touching occipital margin; ocellular and postocellar lines equal in length. Surface of frontovertex very faintly sculptured.

Praescutum, axillae, and scutellum minutely reticulated, subshining. Coxae with sparse, short, silvery hair. Forewing with stigmal vein twice as long as marginal, stigmal and postmarginal veins equal in length.

Propodeum smooth. Gaster smooth, subshining, as long as thorax. Ovipositor sheaths straight on ventral margins, their apices just reaching apex of gaster; apical gastral sternite bearing a minute, projecting point on meson of its posterior margin.

Male.—Length, 2.0 mm. Color as in female, except that median cloud of forewing extends only half way across wing and apical cloud is absent. Antenna with branches relatively short. Genitalia, fig. 10, with sagitta prominently shouldered.

Type locality.—Gainesville, Florida.

Type.—U.S.N.M. catalog number 71977.

Described from 1♀, 1♂ specimens. Holotype ♀, allotype ♂, reared April 14, 1955, at Gainesville, Florida, from adult *Leptoglossus phyllopus* (Linnaeus), by C. N. Patton.

Biological relationships.—This is a primary parasite of the leaf-footed bug, *Leptoglossus phyllopus* (Linnaeus) (Coreidae), emerging from the adult.

**Hexacladia mexicana** Girault

*Hexacladia mexicana* Girault, 1917, Descr. Stell. Nov., p. 5. ♀.

Type locality.—Oaxaca, Mexico.

Type.—U.S.N.M. catalog number 20085. The original description does not state how many specimens were included in the type series, but the Museum catalog shows that the species was based on 1 female specimen.

Host.—Unknown.

Distribution.—Mexico.

The male is unknown and the female is known from only a single type specimen. It shows that the apical gastral sternite is shallowly notched on the meson of the posterior margin and that there are two slender, submedian projections.



**Hexacladia smithii** Ashmead

*Hexacladia smithii* Ashmead, 1891, *Ins. Life* 3:456. ♀, ♂.—Ashmead, 1900, *Proc. U. S. Natl. Mus.* 22:377.—Ashmead, 1904, *Mem. Carnegie Mus.* 1:496.—Costa Lima, 1930, *Mem. Inst. Oswaldo Cruz* 23:159.—Costa Lima, 1949, *Bol. Soc. Bras. Agr.* 11(1):6.

Type locality.—Chapada, Brazil.

Types.—U.S.N.M. catalog number 4743. Described from 2 male, 1 female specimens. Lectotype male labeled, "April, Chapada, *Hexacladia smithii* ♂ Type Ashm." Present designation of lectotype.

Hosts.—*Holymenia clavigera* Herbst (Coreidae), *Pachycoris torridus* Scopoli (Pentatomidae), *Tetyra pinguis* (Germar) (Pentatomidae).

Distribution.—Known from Brazil and the Island of Trinidad.

The female apical gastral sternite has a small median notch on the posterior margin and a pair of slender, submedian projections, fig. 3. The male genitalia, fig. 9, have the sagitta broad at the apex.

**Hexacladia townsendi** (Crawford)

*Sophencyrtus townsendi* Crawford, 1911, *Proc. U. S. Natl. Mus.* 41:276. ♀.  
*Hexacladia townsendi* (Crawford) Girault, 1917, *Descr. Stell. Nov.*, p. 5.—Wille, 1943, *Ent. Agr. Peru, Est. Exp. Agr. La Molina*, p. 28.

Type locality.—Piura, Peru.

Type.—U.S.N.M. catalog number 13869. Described from 1 female specimen. There are 3 additional female specimens of this species in the U.S.N.M. collection that have the same data as the type, but they were not included in the type series.

Host.—*Stenomacra* sp. (Pyrrhocoridae).

Distribution.—Peru.

The male is unknown. The female apical abdominal sternite is deeply incised on the meson of the apical margin and bears a pair of prominent, recurved submedian projections, fig. 7.

## REFERENCES

- ASHMEAD, W. H. 1891. An encyrtid with six-branched antennae. *Ins. Life* 3:455-457.  
 ———. 1900. On the genera of the chalcid-flies belonging to the subfamily Encyrtinae. *Proc. U. S. Natl. Mus.* 22:323-412.  
 ———. 1904. Subfamily II. Encyrtinae in *Classification of the chalcid flies*. *Mem. Carnegie Mus.* 1:292-311.  
 CRAWFORD, J. C. 1911. Descriptions of new Hymenoptera. *Proc. U. S. Natl. Mus.* 41:267-282.  
 DE SANTIS, L. 1965 (1963). Encirtidos de la Republica Argentina. *An. Com. Inv. Cient. Prov. Buenos Aires* 4:11-398, 12 pls.  
 GIRAULT, A. A. 1917. *Descriptiones Stellarum Novarum*, 22 p.  
 HOFFER, A. 1955. Phylogeny and taxonomy of the family Encyrtidae. *Acta Mus. Natl. Prag.* 11(B):3-22.



- HOWARD, L. O. 1892. Insects of the subfamily Encyrtinae with branched antennae. Proc. U. S. Natl. Mus. 15:361-369.
- SCHMIEDEKNECHT, O. 1909. Hymenoptera Fam. Chalcididae. Gen. Ins., fasc. 97, 550 p.

---

## TAXONOMIC NOTES ON THE GELECHIOIDEA

### PART I: THE GENUS *INGA*

(LEPIDOPTERA)

RONALD W. HODGES, *Systematic Entomology Laboratory, Agricultural Research Service, U. S. Department of Agriculture*<sup>1</sup>

ABSTRACT—Eight generic synonyms of the New World genus *Inga* are made, and 77 species are transferred to *Inga*. A list of the known species and recognized synonyms is presented.

In the process of discussing the geographic distribution of the genus *Inga* Busck for a manuscript on the Oecophoridae of North America north of Mexico, I became aware that several genera, proposed by Meyrick for neotropical species, were congeneric with *Inga*. Study of genital characters as well as recognition that some venational characters are variable have led me to this conclusion. The male genitalia are characterized as follows: the aedeagus is a stout to moderately slender cylinder; the vesica may bear a single, stout cornutus or patches of smaller cornuti; the saccular margin of the valva is strongly developed, almost separate, broadly curved; the processus of the sacculus is free and directed toward the costal margin; the distal part of the valva beyond the processus of the sacculus often appears as a lobe; the juxta is well developed, often with a pair of ventrolateral lobes; the gnathos is well developed and does not bear spines; and the uncus is triangular.

Meyrick proposed eight generic names that are junior synonyms of *Inga*. He described 10 neotropical species in the Australian genus *Atelosticha* Meyrick. These are *Inga* species. Clarke (1963) transferred 58 species described by Meyrick in *Machimia* Clemens to *Himmacia* Clarke. Fifty-six of these species are members of the genus *Inga* as determined by the genitalia, particularly the nonspined gnathos.

It is now apparent that *Inga* and allies (*Dolitechna* Meyrick and

---

<sup>1</sup> Mail address: c/o U. S. National Museum, Washington, D.C. 20560.